

*haemolytica* DNA, whereby immunity is induced.

36. (new) The method of claim 35 wherein the step of administering is via the oral route.

37. (new) The method of claim 36 wherein the bacterium is top-dressed on the feed of the ruminant.

38. (new) The method of claim 35 wherein the step of administering comprises injecting the bacterium subcutaneously.

39. (new) The method of claim 35 wherein the step of administering comprises injecting the bacterium intradermally.

40. (new) The method of claim 35 wherein the step of administering comprises injecting the bacterium intramuscularly.

*At Sub* 41. (new) The method of claim 35 wherein the step of administering is via the nose.

42. (new) The method of claim 35 wherein the bacterium is live.

43. (new) The method of claim 35 wherein the bacterium is lyophilized.

44. (new) The method of claim 35 wherein the bacterium is lyophilized and reconstituted.

45. (new) The method of claim 35 wherein the bacterium is killed.

46. (new) A feed for ruminants which comprises a *P. haemolytica* bacterium which (a) expresses no biologically active leukotoxin, (b) expresses a form of leukotoxin molecule which induces antibodies which neutralize biologically active leukotoxin, and (c) contains no non-*P. haemolytica* DNA, whereby immunity is induced.

47. (new) The feed of claim 46 wherein the bacterium is live.

48. (new) The feed of claim 46 wherein the bacterium is lyophilized.

49. (new) The feed of claim 46 wherein the bacterium is lyophilized and reconstituted.

50. (new) The feed of claim 46 wherein the bacterium is killed.

51. (new) A vaccine for reducing morbidity in ruminants, comprising a *P. haemolytica* bacterium which (a) expresses no biologically active leukotoxin, (b) expresses a form of leukotoxin molecule which induces antibodies which neutralize biologically active leukotoxin, and (c) contains no non-*P. haemolytica* DNA.

52. (new) The vaccine of claim 51 wherein the bacterium is live.

53. (new) The vaccine of claim 51 wherein the bacterium is lyophilized.

54. (new) The vaccine of claim 51 wherein the bacterium is lyophilized and reconstituted.

55. (new) The vaccine of claim 51 wherein the bacterium is killed.

56. (new) A temperature sensitive plasmid which replicates at 30 °C but not at 40 °C in *P. haemolytica* and which has an origin of replication of the same incompatibility group as the plasmid which has been deposited at the ATCC with Accession No. 98895.

57. (new) The temperature sensitive plasmid of claim 48 which is the plasmid which has been deposited at the ATCC with Accession No. 98895.

58. (new) A method of inducing immunity to pneumonic pasteurellosis in ruminants, comprising the step of:

administering to a ruminant a *P. haemolytica* leukotoxin protein which (a) is biologically inactive, (b) induces antibodies which neutralize biologically active leukotoxin, and (c) contains no foreign amino acid sequences, whereby immunity is induced.

59. (new) The method of claim 58 wherein the step of administering is via the oral route.

60. (new) The method of claim 58 wherein the leukotoxin protein is top-dressed on the

feed of the ruminant.

61. (new) The method of claim 58 wherein the step of administering comprises injecting the leukotoxin protein subcutaneously.

62. (new) The method of claim 58 wherein the step of administering comprises injecting the leukotoxin protein intradermally.

63. (new) The method of claim 58 wherein the step of administering comprises injecting the leukotoxin protein intramuscularly.

64. (new) The method of claim 58 wherein the step of administering is via the nose.

65. (new) A vaccine for reducing morbidity in ruminants, comprising a *P. haemolytica* leukotoxin protein which (a) is biologically inactive, (b) induces antibodies which neutralize biologically active leukotoxin, and (c) contains no foreign amino acid sequences, whereby immunity is induced.